With respect to claim 20, applicants note that the claimed oscillating member is shown in Figs. 2, 4, 6 and 8-10 of the application drawings, wherein it can be seen that the oscillating member 3 has plural projections extending upward from a disc-shaped member. Each projection has an upper surface in contact with a moving body 5. The surfaces of the projections are the claimed "plural faces in contact with the moving body" recited in claim 20 and amended claim 7. Accordingly, applicants respectfully submit that claim 20 is neither vague, indefinite or inaccurate for the reasons stated by the Examiner, and that the rejection of claims 20 under 35 U.S.C. §112, second paragraph, should be withdrawn.

Claims 1, 9/1, 8 and 9/8 were rejected under 35 U.S.C. §102 as being anticipated by U.S. Patent Nos. 4,562,373 to Tokusima et al. ("Tokusima"), 5,448,127 to Kanazawa ("Kanazawa") and 5,172,023 to Kawai ("Kawai").

Claims 2, 9/2, 3 and 9/3 were rejected under 35 U.S.C. §102 as being anticipated by Japanese Patent Document No. 6-141565 ("Japan '565") or U.S. Patent No. 5,327,040 to Sumihara et al. ("Sumihara").

Claims 4 and 9/4 were rejected under 35 U.S.C. §102 as being clearly anticipated by Sumihara.

Claims 5 and 9/5 were rejected under 35 U.S.C. §102 as being anticipated by Inagaki (UK).

Claims 1-21 were rejected under 35 U.S.C. §103 as being unpatentable over Kawai, Tokusima or Kanazawa in view of Japanese Patent Document No. 1-29783 ("Japan '783") and the admitted prior art. The Examiner stated that each of Kawai, Tokusima and Kanazawa teach the claimed ultrasonic motor structure including at least one portion formed of an insulating material, but do not explicitly teach a self-oscillation drive circuit. The Examiner pointed out, however, that applicants have conceded that this type of drive circuit is widely known for use in motors so that one of ordinary skill in the art would be knowledgeable in the use of such a drive circuit. The Examiner further stated that although the main references do not teach some of the claimed materials, selection from among known appropriate materials has long been held to be within the skill expected of the routineer. In this regard, the Examiner pointed out that Japan '783, for example, teaches use of ceramic for wear protection and that each of the other specifically claimed materials are well known either as insulators, wear protectors or for general use in piezoelectric, ultrasonic motors, and their use would have been obvious to one of ordinary skill in the art.

Regarding applicants' remarks as set forth in their previously-filed response, the Examiner pointed to col. 5,

lines in 42-49 of Tokusima; Kanazawa, reference No. 7, and Kawai, col. 8, lines 8-16 which explicitly teach the use of insulating materials in an ultrasonic motor.

Applicants respectfully traverse the foregoing rejections.

The present invention relates to an improved configuration for an ultrasonic motor mountable in an electronic device in which a specific measure is utilized to ensure that insulation is provided between the power source of the electronic device (and the self-oscillating drive circuit of the ultrasonic motor) and the piezoelectric element of the motor. In a preferred embodiment, the inventive configuration is one in which an ultrasonic motor having various members driven by a driving circuit is mounted in an electronic device such that a power source used for driving the electronic device and the driving circuit of the ultrasonic motor may short circuit the piezoelectric element by virtue of an unintended current path formed between these elements. An example of this problem is illustrated in Fig. 11 of the application drawings, which shows an analog timepiece driven by an ultrasonic motor.

As illustrated in Fig. 11, an oscillating body 3 having a piezoelectric device 4 bonded thereto generates an oscillatory wave by self-excited oscillation to drive a moving

body 5. A base plate 21 of the analog clock is directly connected to the positive terminal of a power supply for driving the clock and serves as a lead wire for carrying a positive potential to the movement. Forming the base plate 21 as a current-carrying member is typically done in the art to minimize product manufacturing cost and to conserve space where miniaturization is desirable. However, while such efficient use of structural components is otherwise beneficial, it causes a problem when an ultrasonic motor is mounted to the base plate 21. In particular, electrodes of the piezoelectric device 4 become short-circuited with the positive power supply terminal through the base plate 21 and stable driving becomes impossible.

The present invention does not relate broadly to ultrasonic motors in general. The claimed invention addresses a specific problem with the configuration of a conventional ultrasonic motor and the manner in which the motor is mounted in an electronic device of the type described above -- a device which presents a potential current path between a power supply used to drive the electronic device (and the self-oscillating drive circuit) and a piezoelectric element of the ultrasonic motor.

Thus, as a preliminary matter, it should be recognized that the independent claims explicitly recite a

structure having a self-oscillating type driving circuit, a power supply circuit for powering the driving circuit, and a piezoelectric-type ultrasonic motor having elements which could, if formed of a conductive material, provide a current path between the power supply and the piezoelectric element.

Accordingly, the claims recite a structure in which an ultrasonic motor is mounted (or mountable) in an electronic apparatus of the foregoing type which presents a potential current path between the power supply that is used for driving the electronic device (and the self-oscillating type drive circuit of the ultrasonic motor) and the piezoelectric element. The claims do not merely recite a generic ultrasonic motor having an element formed of an insulating material. To the contrary. The independent claims explicitly recite the existence of a potential current path between the power supply for powering the self-oscillating drive circuit and the piezoelectric element. An ultrasonic motor not having this possible current path is not contemplated by the claims in the context of infringement or patentability.

Anticipation under 35 U.S.C. §102 requires the disclosure, by a single reference, of all claimed subject matter. In the absence of any disclosure of a driving circuit forming part of a self-oscillating drive circuit, a power

supply for supplying power to the driving circuit, and a potential current path between the power supply and the piezoelectric element as recited by independent claims 1 and 13, anticipation cannot be found. See, e.g., Akzo N.V. v. U.S. International Trade Commission, 1 USPQ2d 1241, 1245 (Fed. Cir. 1986), cert. denied, 482 U.S. 909 (1987) ("Under 35 U.S.C. §102, anticipation requires that each and every element of the claimed invention be disclosed in the prior art"); W.L. Gore & Associates v. Garlock, Inc., 220 USPQ 303, 313 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984) ("Anticipation requires the disclosure in a single prior art reference of each element of the claim under consideration").

Neither Tokusima, Kanazawa, Kawai, Japan '565, Sumihara, or Inagaki discloses the configuration recited in claim 1 or that of claim 13. These references disclose ultrasonic motors having individual elements formed of insulating materials. For instance, Tokusima discloses an ultrasonic motor having a stator formed of a ceramic or resinous material.

However, even though the cited references disclose ultrasonic motors having one or more insulating members, none of the references discloses an ultrasonic motor mounted or mountable in an electronic device having a power supply for powering a driving circuit wherein a current path would exist

between the power supply and a piezoelectric element if a given element of the motor were not formed of an insulating material. The identical disclosure standard needed to support a claim rejection under §102 is not satisfied by any of these references. Indeed, none of the cited references discloses any manner of connection between a power supply of an electronic device and the ultrasonic motor in any way, and the references clearly lack any disclosure of a potential current path between a power supply and a piezoelectric element of the type described above.

Thus, for instance, if the Tokusima motor were mounted in an electronic apparatus, there is nothing about the Tokusima motor that would prevent a current path from being formed between a power supply and a terminal of the piezoelectric element. The claimed invention interposes an insulating member between the power supply and the piezoelectric member so that such a current path cannot be formed. Even though the stator of the Tokusima motor may be formed of an insulating material, this does not mean that if the motor were mounted in an electronic device in such a manner that the stator were not interposed between the power supply and the piezoelectric element, a current path therebetween would be eliminated.

In view of the foregoing, applicants respectfully submit that claims 1-5 and 9/1-5 and 9/8 are not anticipated by the above-cited references.

In analyzing the instant independent claims, it must be kept in mind that the claims do not simply prescribe the use of an insulating material in an ultrasonic motor. They require the use of an insulating material to form at least one of the oscillating member, the pressing mechanism and the moving body which would, if formed of a conductor, provide a current path between at least one terminal of the power source and at least one electrode of the piezoelectric element.

By merely forming a stator of an insulating material, as disclosed in Tokusima, for instance, a current path between the power source and the piezoelectric element is not prevented unless the ultrasonic motor is mounted so that the stator is in electrical contact with the power source and the piezoelectric element. Since Tokusima contains no such disclosure, and the other cited references are equally as silent as to this claimed subject matter, the anticipatory rejections based on the disclosure of insulating materials in the formation of ultrasonic motor components cannot satisfy the above-quoted standard for anticipation under 35 U.S.C. §102. The anticipatory rejections should therefore be withdrawn.

Applicants further respectfully submit that claims 1-21 patentably distinguish over the cited references and that the rejection thereof under 35 U.S.C. §103(a) is in error and should be withdrawn.

Conventional attempts to prevent a current path from developing between the power supply of the driving circuit and the piezoelectric element involve the use of a base plate 21 (see Fig. 11) formed of an insulating material or the provision of a separate insulator between the base plate 21 and the ultrasonic motor. As noted above, however, this increases the size and cost of the device.

The foregoing problem exists because various components of the ultrasonic motor are formed of conductive materials thus necessitating the use of additional, insulating materials. Absent the use of an insulator wherever a current path is likely to exist between the power supply and the piezoelectric element, short-circuiting becomes a concern. When a voltage is applied to the base plate 21 of the above-described analog clock, for example, a current path can easily be formed between at least one of the electrodes of the piezoelectric element and at least one of the power supply terminals. This makes stable driving of the motor impossible.

Since various components of the ultrasonic motor are formed of conductive materials, avoidance of this problem

makes it necessary to terminate the current path between the power supply and the piezoelectric device by forming components of the electronic device contacting the ultrasonic motor of a non-conductive material. However, this imposes restrictions on the electronic device structure in which the ultrasonic motor is mounted. In a small electronic device, it is difficult to provide an insulating structure due to space restrictions and, if an insulating structure is mounted therein, it may be difficult or impossible to also mount an ultrasonic motor.

The present invention overcomes the foregoing difficulties by providing an ultrasonic motor which can be mounted in an electronic device without concern of short-circuiting in the manner described above and without imposing structural restrictions on the electronic device.

In accordance with the present invention recited by independent claim 1, the ultrasonic motor comprises a driving circuit for producing an oscillatory wave and a power source for powering the driving circuit. A piezoelectric element is driven by the driving circuit to undergo vibration and the piezoelectric element and the driving circuit cooperate to form a self-oscillation circuit.

As further recited by independent claim 1, the ultrasonic motor is provided with an oscillating member in

contact with the piezoelectric element for oscillating in response to vibration of the piezoelectric element, a moving body contacting the oscillating member to undergo movement in response to oscillation of the oscillating member, and a pressing mechanism for urging the moving body against the oscillating member.

Claim 13 contains similar language, and requires that at least one component of the ultrasonic motor which, if formed with a conductive surface, would serve as a current path between the power source (of the electronic device in which the motor is mounted) and an electrode of the piezoelectric element, is formed with an insulating surface.

In the conventional device having an ultrasonic motor as described above, the power source of the device, which also provides power to the driving circuit of the ultrasonic motor, is provided with a conductive base plate to reduce the size and production cost of the device. However, these factors result in a product in which a current path exists between the power supply and the piezoelectric element (or self-oscillating drive circuit) of the ultrasonic motor. This makes stable operation of the motor impossible.

As noted above, the present invention overcomes this problem by providing that one or more members of the ultrasonic motor which forms the above-mentioned current path is formed of an insulator.

Therefore, in analyzing the claims, it must be kept in mind that the claims recite a structure in which a current path that would otherwise exist between a power supply of an electronic device and a self-oscillating drive circuit of an ultrasonic motor is prevented by forming the member in which this current path would otherwise exist from an insulating material. A claim reciting such structure is not met by an ultrasonic motor in which an arbitrary element is formed of an insulator unless that element, if formed of a conductor, would serve as a current path between the power supply of the electronic device and the piezoelectric element (or self-oscillating drive circuit) of the ultrasonic motor.

Accordingly, absent any disclosure or suggestion in the art that one or more elements of the ultrasonic motor which serves as a current path between the electronic device power supply and the piezoelectric element is formed of an insulator, the claims are patentably distinct over the prior art.

That is, not only must the art show that one or more of the oscillating member, the pressing mechanism, the moving body and the output member is formed of an insulating member, but that such element would serve as a current path between the electronic device power supply and the piezoelectric element were it not formed of an insulator.

Stated otherwise, the claims do not recite an ultrasonic motor in which an arbitrary "one or more" elements is formed of an insulating material. To the contrary, the claims recite a device in which the member in which the above-described current path is formed is produced of an insulating material so that the current path is prevented.

As a result of the foregoing structure, a current path is not formed between a power supply terminal and an electrode of a piezoelectric element since the member responsible for producing the current path, i.e., one or more of the oscillating member, the pressing mechanism, the moving body and the output means, is insulative in nature. It is thus possible to realize an ultrasonic motor which does not impose structural restrictions on a device in which it is mounted.

Furthermore, an object of the present invention is to provide an ultrasonic motor with stable operating characteristics using a self-oscillating drive circuit formed by a driving circuit and a piezoelectric element. The claims recite a structure for an ultrasonic motor of the foregoing type in which insulation is provided between the self-oscillating drive circuit comprising an oscillating body, a piezoelectric element, an oscillation drive circuit and other members (supporting mechanism, moving body and pressing

mechanism). Insulation provided between the self-oscillating driving circuit and the other member is, for example, to prevent the oscillating body from serving as an electric element in the self-oscillating driving circuit.

None of the cited references recognizes the current path described above, and none of the references discloses or suggests means for overcoming the problem associated with the current path. For instance, the reference to Japan '783 discloses an ultrasonic motor having a ceramic part or a part coated with a ceramic. In particular, a piezoelectric element 1 has an elastic ring 2 disposed thereon. A rotor 3 is disposed on the elastic ring 2. The surface of the rotor 3 is coated with a ceramic. Added durability is provided because the portion used to transmit force is coated with a ceramic. However, there is nothing in Japan '783 that shows a current path or prevention of the current path.

A claim rejection based upon obviousness must be supported by evidence establishing the obviousness of each and every limitation of a rejected claim. Such evidence may consist of a reference which directly establishes this lack of novelty, or a line of reasoning consistent with and motivated by the cited art establishing that such limitations would have been obvious. Anything else is inadequate to meet this burden. There must be some teaching, reason, suggestion, or

motivation found in the prior art that renders every limitation of a claim obvious to support an obviousness rejection under 35 U.S.C §103(a). See, e.g., Symbol Technologies, Inc. v. Opticon, Inc., 935 F.2d 982, 989, 18 USPQ2d 1885 (Fed. Cir. 1991). This burden cannot be met by citing references that, even if combined, fail to teach explicitly recited limitations.

Stated otherwise, an obviousness rejection under 35 U.S.C §103(a) cannot rely solely upon a combination of references that teach some limitations of a claim and omit others.

A continued rejection of independent claims 1 or 13 under §103(a) cannot be supported on the basis of the cited references. As pointed out by the Board in Ex Parte Clapp, 227 USPQ 972, 973 (BPAI 1985):

> To support the conclusion that the claimed combination is directed to obvious subject matter, either the references must expressly or impliedly suggest the modifications urged by the examiner to have been obvious.

The same situation exists here. There is nothing in the references that would expressly or impliedly teach or suggest the modifications required to the cited references to replicate the claimed invention. Nothing in any of the cited references would have suggested to one of ordinary skill in

the art an ultrasonic motor that is mountable in an electronic device in such a manner that produces a current path between a power supply of the apparatus and a piezoelectric element of the motor, and the use of a member of the ultrasonic motor formed of an insulating material or having an insulating surface to eliminate this current path. While insulating materials are disclosed in the prior art, the use of an insulating material to form an arbitrary part of an ultrasonic motor does not assure elimination of the above-described current path.

In view of the foregoing amendments and discussion, the application is now believed to be in condition for allowance. Accordingly, favorable reconsideration and allowance of the claims are most respectfully requested.

Respectfully submitted,

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